

*Please provide the following information, and submit to the NOAA DM Plan Repository.*

**Reference to Master DM Plan (if applicable)**

*As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.*

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

**1. General Description of Data to be Managed****1.1. Name of the Data, data collection Project, or data-producing Program:**

2016 NOAA Topobathy Lidar DEM: Upper Lake Michigan Islands

**1.2. Summary description of the data:**

This digital elevation model (DEM) was created from data collected by Leading Edge Geomatics using a Leica Chiroptera II Bathymetric & Topographic Sensor. The project consists of approximately 205 square miles of data along the shores of the Beaver Island Archipelago and South Manitou Islands in Upper Lake Michigan. The data were acquired between November 16, 2015 through December 5, 2015 for Beaver Island, North Fox Island, Gull Island, High Island, Garden Island, and Isle Aux Galets. The data for South Manitou Island, South Fox Island and several smaller islands that needed to be re-acquired on Beaver Island due to data gaps, were acquired on June 2, 2016 and June 3, 2016. The data includes topobathy data classified as: created, never classified (0), unclassified (1), ground (2), submerged topography (40), water surface (41), derived water surface (42), no bottom found (45) in accordance with project specifications. Data that was classed as ground (2) and submerged topography (40), were used to create the 2 meter DEMs. This dataset contains 3,361 500 m x 500 m lidar tiles.

In addition to the DEM data, the classified lidar point data that these DEMs were created from are also available. The data are available from the NOAA Digital Coast at: <https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=5182>

Original contact information:

Contact Org: NOAA Office for Coastal Management (OCM)

Phone: 843-740-1202

**1.3. Is this a one-time data collection, or an ongoing series of measurements?**

One-time data collection

**1.4. Actual or planned temporal coverage of the data:**

2015-11-16 to 2016-06-03

**1.5. Actual or planned geographic coverage of the data:**

W: -86.184026, E: -85.129054, N: 45.870399, S: 44.962511

**1.6. Type(s) of data:**

*(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)*

**1.7. Data collection method(s):**

*(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy, research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)*

**1.8. If data are from a NOAA Observing System of Record, indicate name of system:**

**1.8.1. If data are from another observing system, please specify:**

**2. Point of Contact for this Data Management Plan (author or maintainer)**

**2.1. Name:**

NOAA Office for Coastal Management (NOAA/OCM)

**2.2. Title:**

Metadata Contact

**2.3. Affiliation or facility:**

NOAA Office for Coastal Management (NOAA/OCM)

**2.4. E-mail address:**

coastal.info@noaa.gov

**2.5. Phone number:**

(843) 740-1202

**3. Responsible Party for Data Management**

*Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.*

**3.1. Name:**

**3.2. Title:**

Data Steward

**4. Resources**

*Programs must identify resources within their own budget for managing the data they produce.*

**4.1. Have resources for management of these data been identified?**

**4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):**

**5. Data Lineage and Quality**

*NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.*

**5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible**

*(describe or provide URL of description):*

**Process Steps:**

- 2016-07-01 00:00:00 - Data for the Beaver Island Archipelago and South Manitou Island project was acquired by Leading Edge Geomatics using a Leica Chiroptera II Bathymetric and Topographic lidar sensor. All delivered lidar data is referenced to: Horizontal Datum-NAD83 (2011) epoch: 2010 Projection-UTM Zone 16 North Horizontal Units-meters Vertical Datum-NAVD88, GEOID12B Vertical Units-meters This dataset encompasses 3,361 500m x 500m tiles. Both green lidar data and NIR lidar data was acquired. Leading Edge Geomatics acquired, calibrated and performed the refraction correction to the lidar data. Dewberry received the calibrated green and NIR data and verified complete coverage. Relative accuracy of the green swaths compared to overlapping and adjacent green swaths as well as the relative accuracy of green swaths compared to overlapping and adjacent NIR swaths was verified through the use of Delta-Z (DZ) orthos created in GeoCue software. Intraswath or within a swath relative accuracy was verified using Quick Terrain Modeler. Profiles of elevated planar features, such as roofs, were used to verify horizontal alignment between overlapping swaths. Dewberry then verified absolute vertical accuracy of the swath data prior to full-scale production. Dewberry used ArcGIS to create 2-D breaklines. The bathymetric points exported by the Leica processing software were aggregated into polygons. These 2D breaklines representing the bathy areas were manually reviewed and adjusted where necessary to ensure all well-defined hydrographic features (at 1:1200-scale) were captured with breaklines. Dewberry used algorithms in TerraScan to create the initial ground/submerged topography surface. Dewberry used the 2-D breaklines to classify the bathymetric bottom and ground points properly in TerraScan. Dewberry filtered out an issue with artifacts caused by scanner noise for one mission in the project. The issue cause a single scan rotation of pulses to be much noisier and have a higher spatial distribution of bathymetric points. Dewberry used the neighboring less noisy points to help select the actual bathymetric points in these areas helping to remove the artifacts and create a smooth consistent transition from low noise to high noise areas. All lidar data was peer-reviewed. Dewberry's QAQC also included creating void polygons for use during review. All necessary edits were applied to the dataset. GeoCue software was used to update LAS header information, including all projection and coordinate reference system information. The final lidar data are in LAS format 1.4 and point

data record format 6. The final classification scheme is as follows: 0-Created, never classified 1-Unclassified 2-Ground 40-Bathymetric bottom 41-Water surface 42-Derived water surface 43-Submerged object, not otherwise specified 44-International Hydrographic Organization (IHO) S-57 objects 45-No bottom found All data is then verified by an Independent QC department within Dewberry. The independent QC is performed by separate analysts who do not perform manual classification or editing. The independent QC involves quantitative and qualitative reviews.

- 2016-07-01 00:00:00 - Lidar data classified as ground (2) and submerged topography (40) were then converted to ESRI multipoint format. These multipoints were then used to generate a terrain and the terrain was converted to a raster in IMG format with 2 meter pixel resolution. The terrain and output raster were created over the full project area to reduce edge-matching issues and improve seamlessness. The raster was clipped to the tile grid and named according to project specifications to result in tiled topobathymetric DEMs. All tiled DEMs incorporate the use of the void polygons. The void polygons represent bathymetric areas with no bathymetric bottom returns and are set as NoData in the DEMs. Void polygon creation is described in the final project report and the void polygon metadata. Since some of the lidar tiles contain no bathy data those empty DEMs were removed to prevent confusion only 3,356 DEM tiles with surface data were created.

- 2017-01-03 00:00:00 - The NOAA Office for Coastal Management (OCM) received the DEM files in img format. OCM ingested the files into the Digital Coast Access Viewer (DAV) system without any changes to projections or datums. All tiled DEMs incorporate the use of the void polygons. The void polygons represent bathymetric areas with no bathymetric bottom returns and are set as NoData in the DEMs. Void polygon creation is described in the final project report and the void polygon metadata. Since some of the lidar tiles contain no bathy data those empty DEMs were removed to prevent confusion only 3,356 DEM tiles with surface data were created.

**5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other plan:**

**5.2. Quality control procedures employed (describe or provide URL of description):**

## **6. Data Documentation**

*The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.*

**6.1. Does metadata comply with EDMC Data Documentation directive?**

No

**6.1.1. If metadata are non-existent or non-compliant, please explain:**

Missing/invalid information:

- 1.6. Type(s) of data
- 1.7. Data collection method(s)
- 3.1. Responsible Party for Data Management
- 4.1. Have resources for management of these data been identified?
- 4.2. Approximate percentage of the budget for these data devoted to data management
- 5.2. Quality control procedures employed
- 7.1. Do these data comply with the Data Access directive?
- 7.1.1. If data are not available or has limitations, has a Waiver been filed?
- 7.1.2. If there are limitations to data access, describe how data are protected
- 7.3. Data access methods or services offered
- 7.4. Approximate delay between data collection and dissemination
- 8.1. Actual or planned long-term data archive location
- 8.3. Approximate delay between data collection and submission to an archive facility
- 8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?

**6.2. Name of organization or facility providing metadata hosting:**

NMFS Office of Science and Technology

**6.2.1. If service is needed for metadata hosting, please indicate:**

**6.3. URL of metadata folder or data catalog, if known:**

<https://www.fisheries.noaa.gov/inport/item/48379>

**6.4. Process for producing and maintaining metadata**

*(describe or provide URL of description):*

Metadata produced and maintained in accordance with the NOAA Data Documentation Procedural Directive: [https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC\\_PD-Data\\_Documentation\\_v1.pdf](https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-Data_Documentation_v1.pdf)

**7. Data Access**

*NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.*

**7.1. Do these data comply with the Data Access directive?**

**7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?**

**7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:**

**7.2. Name of organization of facility providing data access:**

NOAA Office for Coastal Management (NOAA/OCM)

**7.2.1. If data hosting service is needed, please indicate:**

**7.2.2. URL of data access service, if known:**

<https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=6195>

[https://coast.noaa.gov/htdata/raster2/elevation/MI\\_Upper\\_Lake\\_MI\\_Islands\\_Topobathy\\_DEM\\_2016\\_6](https://coast.noaa.gov/htdata/raster2/elevation/MI_Upper_Lake_MI_Islands_Topobathy_DEM_2016_6)

**7.3. Data access methods or services offered:**

**7.4. Approximate delay between data collection and dissemination:**

**7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:**

## **8. Data Preservation and Protection**

*The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.*

**8.1. Actual or planned long-term data archive location:**

*(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)*

**8.1.1. If World Data Center or Other, specify:**

**8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:**

**8.2. Data storage facility prior to being sent to an archive facility (if any):**

Office for Coastal Management - Charleston, SC

**8.3. Approximate delay between data collection and submission to an archive facility:**

**8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?**

*Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection*

**9. Additional Line Office or Staff Office Questions**

*Line and Staff Offices may extend this template by inserting additional questions in this section.*